Exhibit A

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

WAG ACQUISITION, L.L.C.,	§	
Plaintiff,	§	
– against –	§	No. 6:21-cv-00815-ADA
	§	Patent Case
AMAZON.COM, INC., AMAZON WEB SERVICES. INC., and AMAZON.COM SERVICES LLC,	§	
Defendants.	§	
WAG ACQUISITION, L.L.C.,	§	
Plaintiff,	§	
– against –	§	No. 6:21-cv-000816-ADA
	§	Patent Case
GOOGLE LLC and YOUTUBE, INC.,	§	
Defendants.	§	

DECLARATON OF KEITH J. TERUYA

I, Keith J. Teruya, declare as follows:

1. I am submitting this declaration with regard to certain questions of a technical nature that have been referred to me in connection with the above-referenced litigation, which accuses the Defendants of infringing U.S. Patent Nos. 9,742,824 (Compl. Ex. A) (the "'824

Patent"); 9,729,594 (Compl. Ex. B) (the "'594 Patent"); and 9,762,636 (Compl. Ex. C) (the "'636 Patent") to Harold Price (collectively, the "Asserted Patents").

2. I am being compensated for my work in this matter by WAG Acquisition, L.L.C. ("WAG"), at the rate of $450.00 per hour, with reimbursement for actual expenses. I have no personal or financial stake or interest in the outcome of the above-referenced litigation. My compensation is not tied to the outcome of this matter, is not based on the substance of the opinions rendered here, and I have no financial interest in WAG.

I. QUALIFICATIONS

3. I have a long professional background in information technology and network engineering, and for the past 20 years I have been the chief executive officer of a specialized Internet hosting company that I founded, which among other things provides Tier I Network Operations Center capabilities for corporations, local municipalities, Federal Government programs, and regulatory agencies in and around southern California. Over the course of my career I have developed extensive technical experience in the field of the Asserted Patents, as discussed briefly below, including experience concerning multimedia communication protocols over the Internet and computer networks. A copy of my curriculum vitae is attached as Exhibit A.

4. My day-to-day work in my present capacity involves direct hands-on as well as strategic involvement in the issues of networked data distribution and access, including without limitation architecting and configuring high-capacity content servers, proxy servers, content distribution networks (CDNs), edge and origin servers, peer-to-peer communications, as well as the lower-level routing and switching infrastructure and communications protocols and standards underlying such systems.

5. In prior positions, I was the Chief Technology Architect (in addition to being the CEO) for 15 years for a company I founded that was the original communications technology "skunk-works" for Novell Inc. In this capacity, I designed basic and advanced telecommunications and network interfaces for Novell and other companies and developed a mastery of the standards and protocols underlying the Internet. I authored the Network Communications Services Interface ("NCSI") that became a de-facto communications software LAN/WAN standard, with more than 3 million deployments of software. I also developed protocol adjustments in Novell IPX Protocol for adaptive packet buffering required by LAN/WAN communication (Asynchronous and LAPB X.25) gateways, receiving Industry Product of the Year awards for successive years (1988, 1990, 1991 and 1996).

6. I previously served for 10 years architecting network information processing technologies for Goldman Sachs as a senior consultant. In this capacity, I was the architect, designer, development manager, and developer in Goldman's Network Workstation Technologies Department. I was also the architect of Goldman's product strategy and deployment of online delivery of consolidated live market data information into local and wide area network-based workstations for mission critical securities trading operations in the worldwide trading rooms of the firm. In particular, I developed proprietary adaptive buffering protocols to mitigate stream delays when terrestrial transatlantic data links were routed through backup satellite connections affecting the flow of steaming market data feeds used for program trading operations.

7. As Chief Technology Officer of ShowBizData Inc. between 2000 and 2002 as an "early adopter" pioneered the online Internet streaming of various lived events of the Cannes

Film Festival, BFTA Awards and the Sundance Film Festival using both commercial and proprietary systems we architected and developed.

8. I am also a Network Computing Paradigm Award recipient.

9. I believe that I am qualified to provide reliable technical opinions in the field of the Asserted Patents.

II. LEVEL OF SKILL IN THE ART

10. I have been asked to identify the level of training and/or experience that would qualify someone as a person of ordinary skill in the art ("POSITA"), in the field of the Asserted Patents (Internet streaming media), circa 1999-2000. In my opinion, a POSITA would have working familiarity with the basic standards applicable to distribution content over the Internet, including the most common video encoding and streaming protocols. In my view, the education and/or working experience necessary to acquire the requisite familiarity with the subject matter to qualify as a POSITA would have included either (1) a bachelor's degree or equivalent in a field such as Electrical Engineering, Computer Engineering, or Computer Science, or an equivalent field that includes network engineering as a topic of study, plus at least one year of practical academic or industry technical experience in the computer network field, such as serving as an engineer for an streaming content provider performing network design, development, or configuration tasks, or as a software developer for network communications software or related utility software, or (2) or at least three years' fulltime technical experience as stated (or an equivalent combination of academic study and work experience).

III. TECHNICAL BACKGROUND

11. I refer herein to text found in the specifications of the Asserted Patents. These patents differ in the claims appended at the end of the respective patent documents, but share a

common written description preceding the claims, and a common set of drawings. However, due to pagination and other incidents of the Patent Office printing process, the line and column citations for specific wording varies slightly from patent-to-patent. Unless otherwise noted, my citations are to the column and line numbers of the ’594 patent (chosen only because that is the patent most cited by the Defendants in their submissions).

12. Digital media programming may be collected in the aggregate in a media file on an electronic storage device, e.g., a computer disk. *See* 1:57-60.

13. The programming may be distributed by distributing replicas of the physical medium (e.g., CDs or DVDs), or by download over a communications network of the entire file comprising the program.

14. However, it is often considered advantageous to stream the file rather than provide physical copies or a download of the entire program, for numerous reasons, including, for example, handling live programming where the program may be ongoing or concerns a current event, and should be delivered in at least perceived real time. *See, e.g.*, 1:60-67. It is also well appreciated that other reasons for streaming as opposed to download include efficiency of time and bandwidth utilization, limiting unauthorized copying, etc.

15. Digital media comprises a time-sequenced succession of data elements, into which an audio/video program is digitally encoded, and from which encoding it is electronically played out, in the proper sequence, in a player device. *See, e.g.*, 6:30-32.

16. Communicating a time-sequenced and continuous stream of data such as that in an audio/video encoding and playback places demands on the communications channel, especially where the channel is over the Internet. *See* 2:34-40.

17. The Internet operates on individually routed packets of typically 1500 bytes each. Data elements cognizable to user applications are repackaged into such packets, on the server, for transmission. The packets are reassembled at the receiving end for the corresponding application on the receiving side. "Transport" mechanisms exist to handle transit of the packets through the network (such as Transmission Control Protocol (TCP), though there are others). Transport protocols such as TCP are engineered to ensure "reliable" delivery of the packets – i.e., that they all (eventually) get through, and are provided at the receiving end in the proper order. However, given the compromises built into a routed packet network such as the Internet, such "transport protocols" do not guarantee "timely" delivery of the packets. There is inherent uncertainty as to when packets will arrive.

18. Distributing Internet streaming media to a mass audience requires other techniques (beyond what is provided at the transport layer of the networking technology), in order to provide acceptable streaming startup characteristics and continuity. These are addressed by the patents in this case. Without such measures, the streaming can be very frustrating to users, for two principal reasons: (1) the necessity to "buffer" data on the player side before starting playback, entailing a startup delay comparable in duration to the number of seconds of buffer protection required, and (2) interruptions resulting when the player buffer runs out of data.

19. The patents in this case provide solutions for this problem.

20. In one embodiment (not directly involved here), the server also buffers data and uses the buffer it builds up prior to starting the transmission to jump-the start with a high-speed transmission of an entire buffer-load of streaming data to the player. This provide a rapid startup of playback and establishes a full buffer on the player side to protect the remainder of the transmission. *See, e.g.*, *id.*, 8:1-26.

21. The solution particularly relevant to the infringement charged in this case is disclosed and claimed in connection with what is referred to as a "pull" embodiment. *See id.*, 14:42-15:18.

22. In the pull embodiment, as described primarily at 14:42-15:18 in the '594 patent, the pace of transmission of a stream can instead be regulated by player requests for elements of the stream. In the pull embodiment, streaming data elements are accumulated on the server side from a media source (similar to the "buffer" in the above-described embodiment), and are each associated with serial identifiers. In the pull embodiment, the player monitors the state of its own buffer, including without limitation the level of the buffer and what elements it needs for continuous playback, and requests them from the server by their serial identifiers, as needed to provide uninterrupted playback. So long as the connection allows each element to be sent in less time than it takes to play it back, this technique also serves as an effective stream control mechanism. The first so-identified element in this embodiment corresponds to the initial buffer-load of data in the buffering embodiment, and its rapid transfer likewise jump-starts the filling of the player buffer and the ability to begin playback, providing a startup benefit comparable to that provided by the buffering embodiment.

IV. VIEWS ON SPECIFIC TECHNICAL ISSUES

23. The Defendants in the Amazon and Google cases make overlapping claim construction requests. I have been asked to address specific technical issues referred to me with regard to the Defendants' requests.

1. Playback rate

24. "Playback rate" is sometime used in streaming technology to refer to the "normalness" of playback, and described by a metric, which is not a data rate itself, but rather a

characteristic of how the data is to be played back. Thus, in that usage, "1.0" means normal rendition, numbers higher than 1.0 mean speeded-up rendition, and numbers lower than 1.0 mean slow motion (or if negative, reverse) rendition.

25. The programming is also encoded, typically not just as binary 1s and 0s corresponding to raw camera and microphone inputs, but in a manner that processes, shapes, organizes, and most importantly, compresses the digital representation. An important variable in the encoding is the resolution of the media – how many pixels are in the image and its size and shape, and how precisely and often sound, illumination and coloring levels are sampled. It is customary to encode the media at a nominal bitrate (bits per second). The actual bitrate will often be variable, due to taking advantage of providing higher compression to slow-moving material (because the data for slow-moving material has more redundancy that can be removed by compression). The nominal bitrate in such cases is approximate.

26. As used in the specification, a POSITA would understand "playback rate" to refer to the bitrate of the media data at a normal (1.0) rendition. Because of the considerations noted above, the playback rate, as a data rate, may of necessity be approximate.

2. "as required to maintain about a predetermined number of media data elements"

27. A POSITA might analogize this to maintaining about a target level in a gas tank during an automobile trip. Any attentive driver appreciates that due to variable distances to gas stations, the tank level may end up varying slightly from the target before a fill-up, with no operational downside.

28. In the streaming context, there can well be a similar factor at play, resulting from the varying sizes of streaming data elements, due to variable bitrate (VBR) encoding. This is addressed at 4:55-5:6 of the specification.

29. Media data elements are discrete, as far as media applications are concerned. In the case where the media is VBR-encoded, the size of the elements can vary. Since the elements are handled as units, and the size (as well as duration) of individual elements can vary, target buffer levels therefore must be approximate. But since multiple elements will be in the buffer, the variation in just how full the buffer is when near the target level is not operationally significant. It is akin to a rounding error, or filling a bucket to a specified level with irregular objects. This is not a practical issue at all for a POSITA, any more than a recipe calling for two cups of large shrimp would be indefinite for a chef.

3. "each sending is at a transmission rate as fast as the data connection between the server system and each requesting user system allows"

30. The specification says that "[t]he server buffer 14 'sends' data by delivering it to the transport mechanism." A POSITA understands that, in a server sending data over a transport mechanism, the transport mechanism makes a "connection" with the requesting user system, and that once data is delivered to the transport mechanism, for that connection, it is sent to the user system as fast as possible, taking into account everything that Defendants raise, including the maximum capacity of the connection elements themselves, the available bandwidth, and the permitted bandwidth. "As fast as the data connection … allows" requires nothing more than simply handing the data to the transport mechanism. This is evident to a POSITA even without reference to the specification, but is certainly reinforced by the express description at 8:38-48 (of the '824 patent; 8:36-46 of the '594 patent).

4. "data rate"

31. A POSITA would understand the term "data rate" as used the specified claims as referring to the rate at which the connection between the server and the user system operates. The claims specify both that the data is sent as fast as this connection will allow, and that that

rate should also be more rapid than the playback rate. That is exactly what the specification teaches, when it states (just like the claim) that (i) "The media data will be transmitted to the user as fast as the data connection between the user computer and the server will allow." 14:60-62 (as to which, see point 3 above), and (ii) "the connection from the Internet to the user is faster than that required for media playback." 9:62-63. A POSITA understands that the latter claim requirement in particular ("wherein the data connection has a data rate more rapid than the playback rate") flows from the need to be able to replenish the user buffer on demand, and that to do so reliably requires the connection to supply data to the user buffer faster than it is played out.

I declare under penalty of perjury that the foregoing is true and correct. Executed at McMinnville, Oregon, U.S.A. on March 31, 2022.

KEITH J. TERUYA